

## HISTORY AND TECHNOLOGY FORUM

### Beyond the closed world

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In 1988, the late Michael Mahoney challenged historians of computing to ask the ‘big questions’ common to their field and the history of technology. Only in this way, Mahoney argued, could the history of computing shift its focus from hardware and computer pioneers to themes of interest to the history of science and technology.<sup>1</sup> Since the early 1990s, several scholars have, in effect, written books that take up Mahoney’s challenge. These include Paul Edwards’s *The Closed World* (1996), Janet Abbate’s *Inventing the Internet* (1999), David Grier’s *When Computers Were Human* (2005), Atsushi Akerai’s, *Calculating a Natural World* (2006), and Nathan Ensmenger’s *The Computer Boys Take Over* (2010).<sup>2</sup> These books explore such themes as the government’s support of research and development, the building of sociotechnical systems, labor and technology, and gender and technology – all themes in the history of technology that Mahoney mentioned (or alluded to in the case of gender) in 1988.

Eden Medina’s *Cybernetic Revolutionaries* (2011) continues that laudable trend and further expands the historiography of computing by exploring the circulation of science and technology between the global north and the global south.<sup>3</sup> Even more than her predecessors, Medina places her story in a robust enough historical setting that the book contributes as much to the history of Chile as it does to the history of computing. *Cybernetic Revolutionaries* thus fulfills an aspiration in the history of technology of bringing technology into the realm of general history. I discuss these accomplishments in light of recent scholarship in the history of cybernetics and recent work that goes beyond Edwards’s analytical framework of the closed world conflict between the USA and the USSR to study technology and politics in the Cold War.

The history of cybernetics has blossomed since the early 1990s, stimulated by renewed concerns about the relationship between humans and machines arising from the advent of cyborg studies and the explosive growth of the internet.<sup>4</sup> Scholars from a wide range of disciplines – including history, sociology, cultural studies, and disability studies – have analyzed the pre-history and war-time origins of cybernetics,<sup>5</sup> the national trajectories of cybernetics in the USA, Europe, and the Soviet Union,<sup>6</sup> how discourses and practices in the physical sciences, engineering, the social sciences, and the humanities were inflected by cybernetics,<sup>7</sup> and how cyberneticians helped create a disembodied, cyborg posthuman subject that is displacing the liberal humanist subject.<sup>8</sup>

Taken as a whole, this literature demonstrates the excitement postwar scientists, engineers, and humanists felt about cybernetics and its claim that communications and control engineering held the keys to understanding both humans and such intelligent machines as

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the new digital computers (commonly known as ‘electronic brains’). Although proponents ascribed multiple meanings to the interdisciplinary of cybernetics, they believed that its universal language of information, feedback, and control applied to all systems – living and non-living – from the level of the cell to that of society. The cybernetic vision dimmed in the USA in the 1960s, when cybernetics began to lose its scientific status for a variety of reasons, including its appeal to groups considered to be on the fringe of science and engineering.<sup>9</sup>

Situating her book within this literature, Medina explores one aspect of the ‘disunity of cybernetics’ – its different interpretations in different countries – by studying cybernetics outside of the USA, Europe, and the Soviet Union.<sup>10</sup> She takes seriously the transnationalism of cybernetics by analyzing the sustained collaboration between the prominent English cybernetician Stafford Beer and the Chilean team of administrators, engineers, and technicians – headed by Fernando Flores – who built Proyecto Synco (Project Cybersyn) in the early 1970s.

The advantages of placing her story in a rich historical setting can be seen by comparing *Cybernetic Revolutionaries* with Andrew Pickering’s *The Cybernetic Brain* (2010), a sociological and philosophical history of British cybernetics.<sup>11</sup> Both books discuss Beer’s Viable Systems Model as an innovation in cybernetic management that sought to homeostatically control the nationalized parts of the Chilean economy as a complex social system. While Pickering sees this application as an example of the performativity he considers to be characteristic of British cybernetics (and as a model to reform modern science), Medina discusses the model and Project Cybersyn in regard to President Salvador Allende’s program of building Chilean socialism as an alternative Middle Way between US corporate capitalism and technocratic Soviet communism. In chronicling the struggles of Beer and the Chilean team to design and build Project Cybersyn in the face of the lack of up-to-date computer systems (partly caused by an invisible US economic embargo), the need to revise British-written software on the spot, shifting government priorities, and worker opposition, Medina vividly illustrates the difficulties of turning paper models into sociotechnical systems in a transnational setting.

The main theme of *Cybernetic Revolutionaries* is technology and politics, which is appropriate because of the close ties between cybernetics and politics throughout its history. Since its founding in the late 1940s, proponents and critics alike have identified cybernetics with conflicting political positions. In a newspaper review of *Cybernetics* (1948), the book by MIT mathematician Norbert Wiener that named the new science, French cleric Père Dubarle predicted that cybernetics could lead to a *machine à gouverner*. This centralized computer system would collect the world’s social and economic information and apply statistical prediction theory and game theory to this data to enable a world state to make political and economic decisions (foreshadowing critics’ fears about Project Cybersyn). Dubarle recommended that cyberneticians add anthropologists and philosophers to their teams to ease the conditions of life under this new world order. Wiener thought Dubarle’s analysis was perceptive.<sup>12</sup> He used it to buttress his own warnings, first made in *Cybernetics* and amplified in the *Human Use of Human Beings* (1950), that politicians and labor leaders should guard against misuses of cybernetics, especially in automatic factories that caused mass unemployment and computerized decision-making in the military.<sup>13</sup> While critical of capitalism and militarism, Wiener believed in a humanistic democratic liberalism, which he thought cybernetics would support if used properly as a science and a technology.<sup>14</sup>

In the Soviet Union, journalists and academicians initially criticized cybernetics as a capitalist, ‘reactionary pseudoscience’ in the early 1950s, then changed course a decade

later and proclaimed cybernetics as the organizing principle of science and the economy in the Russia, a political discourse Slava Gerovitch has called Cyberspeak. The volume *Cybernetics at the Service of Communism* (1962), edited by Aksel' Berg, chair of the Soviet Council on Cybernetics, indicates the scope of that utopian vision.<sup>15</sup> As Medina notes, the US Central Intelligence Agency was so concerned about a perceived 'cybernetics gap' between the USA and the Soviet Union that it helped establish the American Society for Cybernetics in 1964 to shore up the languishing field. The CIA analyst who headed this effort, John J. Ford, was not worried so much that the Soviets were ahead of the USA in computers – in fact, they were far behind – but that the unifying field of cybernetics had splintered into subspecialties in the USA and would thus not be able to organize science, technology, and economic growth in the grand Soviet manner. Gerovitch remarks that the Soviet enthusiasm for cybernetics became so well known in the USA that it 'tinged this field with the red of communism,' one of the reasons for its decline in that country.<sup>16</sup>

In contrast, Fred Turner emphasizes the politically liberating view of cybernetics presented to the US counterculture. They could read about Wiener's interpretation of cybernetics in Stewart Brand's *Whole Earth Catalog* in the 1960s and anthropologist Gregory Bateson's cybernetic epistemology in Brand's *Co-Evolutionary Quarterly* in the 1970s. Turner refers to this appropriation of cybernetics as one aspect of the 'forgotten openness of the closed world.' For Turner, cybernetics was not simply the basis for a cyborg discourse that supported the closed-world discourse, as in Edwards's account, but a field that was open to re-appropriation by Brand, Bateson, and the counterculture.<sup>17</sup> Many US liberals were more critical, associating cybernetics with the technocratic ideology of systems analysis that prevailed in President Lyndon Johnson's defense department.<sup>18</sup>

Beer and Flores encountered some of these conflicting political interpretations of cybernetics when they publicized Project Cybersyn, especially that it was a Big-Brother form of totalitarianism. For Medina, this is a *reflection* of Cold War anxieties that exist outside of Chile. It shows that she has turned her analytical lens from the global confrontation between the USA and the USSR to the local perspective of Beer and his team looking *out* from Chile to the superpowers. By embedding herself inside a 'developing' country and viewing the interactions between Project Cybersyn and the superpowers through the eyes of her actors on the ground, who work in a national and a transnational setting, Medina makes what I consider to be the most productive methodological move in the book. The perspective resembles that in Ross Basset's study of US-trained Indian elites setting up computer centers at technical institutes in India, and in Honghong Tinn's study of university officials collaborating with visiting US engineers and social scientists to establish a computer center in Taiwan.<sup>19</sup> Bassett, Tinn, and Medina move our perspective beyond the closed-world militaristic rationale for building computer systems, while still taking into account Cold War politics.

This method shares some goals with the 'transregional perspective' advocated by Gabriel Hecht and Edwards in 2007 as a means to move scholarship on technology in the Cold War beyond the USA, Europe, and the Soviet Union. Drawing on their individual researches on the history of computing and nuclear power in the Cold War – and, notably, dropping Edwards's own closed-world framework – Hecht and Edwards argue that a global view of sociotechnical systems allows for a transregional approach because nuclear and computer systems extended beyond national boundaries in 'developed' countries to include, for example, offshore uranium mines and microchip manufacturing plants. While colonial and postcolonial relationships were prevalent in nuclear systems,

they argue that these relations were absent in the development of computers. Instead, countries outside the USA – in England, France, Brazil, the Soviet Union, and South Africa – engaged in unsuccessful attempts to promote ‘technological nationalism’ by developing indigenous computer industries that could compete with IBM.<sup>20</sup>

Medina takes a different tack. In her world – as opposed to Edwards’s closed-world framework, a metaphor drawn from the literary criticism of the theater<sup>21</sup> – the USA and the Soviet Union are offstage. The USA hovers as a powerful force that produces computers and software, and covertly imposes an economic blockade that limits the computer technology available to Project Cybersyn. The Soviet Union is an unseen, paradigmatic example of cybernetic economic planning that Beer and Allende want to avoid when creating the Chilean Middle Way, and the communist bogey that critics refer to when claiming that cybernetic systems are authoritarian and technocratic. England appears on Eden’s stage, not as a Cold War player, but as a source of expertise in cybernetics management, operations research, and system modeling (though, through a software language, DYNAMO, developed in the USA). The circulation of cybernetics expertise from England to Chile and back to England takes center stage away from the USA–Soviet conflict. The closed world is present ideologically, a bipolar political spectrum that Allende, Beer, Flores et al., try to navigate in their attempts to merge the utopian visions of Chilean socialism with Beer’s (misunderstood) form of cybernetic control in Project Cybersyn.

The fact that both projects were extinguished with Allende’s death in a military coup in 1973 prevents Medina from being able to assess how well Project Cybersyn enacted the ‘technopolitics’ – to use Hecht’s apt phrase<sup>22</sup> – desired by its designers. The book thus leaves unsettled debates about the politics of cybernetics in general, Beer’s Viable Systems Model and Project Cybersyn in particular, and philosophical debates about the politics of technology.<sup>23</sup>

As Medina states, her book illustrates the difficulties involved in embedding political values in a technological system and that ‘sociotechnical engineering’ helped organize social and political relations in Project Cybersyn. Yet the book reminded me of the importance of investigating how historical actors interpret the politics embedded in or exerted by a sociotechnical system. Those portions of the book support work by Donald MacKenzie and Hecht on the social construction by engineers and managers of what was ‘technical’ and what was ‘political’ in their case studies of the accuracy of American nuclear weapons and the national identities of nuclear power plant designs in postwar France.<sup>24</sup> Medina comes into her own in realm of technology and politics when she steps beyond the closed world to view Cold War computer systems outside the bipolar frame. In that manner, the richly textured, local and transnational story in *Cybernetic Revolutionaries* helps to open up research on the international role of science and technology – not just computers – in the Cold War.

## Notes

1. Mahoney, ‘History of Computing.’
2. Edwards, *Closed World*; Abbate, *Inventing the Internet*; Grier, *When Computers Were Human*; Akera, *Calculating a Natural World*; and Ensmenger, *Computer Boys Take Over*.
3. On the circulation of science and technology as a historiographic theme, see Anderson and Adams, ‘Pramoeyda’s Chickens.’
4. See, e.g., Haraway, ‘Manifesto for Cyborgs;’ Gray, *Cyborg Handbook*; and Law and Moser, ‘Cyborg.’
5. Mindell, *Between Human and Machine*; and Galison, ‘Ontology of the Enemy.’

6. Heims, *Cybernetics Group*; Pickering, *Cybernetic Brain*; Aumann, 'Distinctiveness of a Unifying Science;' Mindell et al., 'From Communications Engineering;' and Gerovitch, *From Newspeak to Cyberspeak*.
7. Kline, 'Where are the Cyborgs?' For specific fields, see, e.g., Kay, *Who Wrote the Book of Life?*; Kline, 'Cybernetics, Automata Studies;' Turner, *From Counterculture to Cyberculture*; Richardson, *Feedback Thought*; Edwards, *Closed World*, chaps 6–8 (cognitive psychology and AI); Light, *From Warfare to Welfare*; Geoghegan, 'From Information Theory;' Mills, 'Disability and Cybernetics;' Pickering, *Cybernetic Brain* (psychiatry, music, art, and architecture); and Dunbar-Hester, 'Listening to Cybernetics.'
8. Hayles, *How We Became Posthuman*.
9. Bowker, 'How to be Universal;' and Galison, 'Americanization of Unity.' On the decline of cybernetics in the USA, see Kline, 'Where are the Cyborgs?' 351–54; and Eden, 'Cybernetics.'
10. Medina draws on an unpublished paper of mine for the concept of the 'disunity of cybernetics' (*Cybernetic Revolutionaries*, 9, 11). Before the book was published, I commented on its Introduction and shared some correspondence from the Heinz von Foerster Papers at the University of Illinois (n. 19, p. 297).
11. For a review of the book, see Kline, 'Cybernetics as a Usable Past.'
12. Dubarle's review is partially quoted in Wiener, *Human Use of Human Beings*, 206–09. For the context of his review, see Mindell et al., 'From Communications Engineering,' 75–76.
13. Wiener, *Cybernetics*, 37–39; and Wiener, *Human Use of Human Beings*, chaps 9–10.
14. On this view of Wiener's politics, see, e.g., Hayles, *How We Became Posthuman*, chap. 4; and Turner, *From Counterculture to Cyberculture*, 23–24.
15. Gerovitch, *From Newspeak to Cyberspeak*, chaps 3, 6. Cybernetics followed a similar ideological path in France and Eastern Europe. See Mindell et al., 'From Communications Engineering,' 74–81; and Aumann, 'Distinctiveness of a Unifying Science,' 23.
16. Conway and Siegelman, *Dark Hero*, 317–20, 330–31; John J. Ford, 'Long-range-scientific Capabilities of the USSR (1963–73): The "Complex Scientific Problem, Cybernetics,"' May 1, 1963, working draft, Walter Rosenblith Papers, Institute Archives, MIT, Cambridge, MA, box 50; and Gerovitch, 'Cybernetics Scare,' quotation on 38.
17. Turner, *From Counterculture to Cyberculture*, 16–28, chaps 2, 4.
18. See, e.g., Lilienfeld, *Rise of Systems Theory*.
19. Basset, 'Aligning India;' and Tinn, 'Working with Computers.' For a non-computer example of this approach, see Moon, 'Takeoff or Self-sufficiency?' Transnationalism has also become a theme in the history of science in the Cold War. See Heyck and Kaiser, 'Introduction.'
20. Hecht and Edwards, *Technopolitics of Cold War*.
21. Edwards, *Closed World*, 12–13.
22. Hecht, *Radiance of France*, 15–17.
23. Medina relates her work to Langdon Winner's well-known article, 'Do Artifacts Have Politics?' in his *Whale and the Reactor*, but could have done much more in this regard. I was struck, for example, by how the plasticity of some design elements of Project Cybersyn corresponded to Winner's example of the low Long-Island bridges enacting racist politics in New York City, and how the criticism that Cybersyn was a centralized command-and-control system corresponded to Winner's argument that nuclear power plants required a centralized form of political control.
24. MacKenzie, *Inventing Accuracy*; and Hecht, *Radiance of France*.

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